DRAFT

Permit Application Review Summary

Application No.: Significant Modification No. 0097-11

Permit No.: Covered Source Permit (CSP) No. 0097-01-C

Applicant: Kauai Island Utility Cooperative (KIUC)

Facility: Port Allen Generating Station
261 Akaula Street
UTM Coordinates: 2422.222 m N 439.2516 m E
Eleele, Kauai, Hawaii 96705

Mailing Address: Kauai Island Utility Cooperative
4463 Pahee Street, Suite 1
Lihue, Hawaii 96766-2032

Responsible Official: Mr. David Bissell
President and Chief Executive Officer
Kauai Island Utility Cooperative
(808) 246-4300

Point of Contact: Nancy Matthews
Sierra Research
1801 J Street
Sacramento, California 95814
(916) 444-6666

Application Dates: September 22, 2015, and additional information dated January 4, 2016

Proposed Project:

SICC 4911 (Electric Services)

KIUC is requesting approval to burn specification used oil in the steam boiler, Unit S-1, without blending it with virgin oil, i.e., fuel oil no. 2, biodiesel, or a combination of fuel oil and biodiesel. No increase in the amount of specification used oil is being requested. The permit condition in Attachment II(D), Special Condition No. C.2 will be revised as follows:

2. Specification (spec) used oil may be burned in steam boiler S-1 at a maximum rate of 1,000,000 gallons per year ~~and shall not exceed 49% of the heat input to the boiler at any time. Transformer specification used oil with a PCB content of greater than 2 ppm may be burned in steam boiler S-1 at a maximum rate of 4.5 gallons per hour (gph). The specification used oil or transformer specification used oil shall be blended and burned with fuel oil no. 2, biodiesel, or a combination of fuel oil no. 2 and biodiesel, at all times~~.

The purpose of the proposed change is to allow KIUC to generate electricity more economically, by using the lowest cost fuel available. The proposed change will also allow KIUC to recover millions of BTUs of energy that would otherwise be wasted and has the potential to reduce the utility's use of virgin fossil fuel.

The project is considered to be a significant modification under the covered source permit regulations. The change in fuel blending practices will change the criteria pollutant emission factors that must be used to calculate emissions from the boiler while burning specification used oil. Because there is no increase in the total quantity of specification used oil that may be burned each year, there will be no increase in emissions of HAPs as a result of the proposed amendment. However, the change in criteria pollutant emission factors increases the calculated emissions of NO_x, SO_2, PM_{10} and $PM_{2.5}$ from the boiler, requiring the application to be processed as a significant modification rather than a minor modification.

A check for $1,000.00 was submitted by the applicant for a significant modification of a covered source and processed.

Equipment Description:

Unit Number	Manufacturer	Model/ Serial Number	Rated Capacity		
			MW	MMBtu/hr	gal/hr
S-1	Combustion Engineering Steam Boiler/Turbine	20810/ 20810	10	156.3	1135

Air Pollution Controls:

The steam boiler S-1 is equipped with low-NO_x burners.

Insignificant Activities:

No change from the previous renewal application.

Fuels:

The steam boiler S-1 may burn fuel oil no. 2, biodiesel, specification (spec) used oil, and transformer specification used oil.

Fuel Oil No. 2 or Diesel No. 2	
Sulfur, wt. %	0.4% max
Heating value	137,000 Btu/gal (typical) 19,700 Btu/lb
Viscosity @ 40EC, CST	3.5
Gravity, API	37
Flash point, °F	140 min
Ash, wt. %	0.01 max
Specification Used Oil	
Heat content	135,000 Btu/gal (default)
Sulfur, wt. %	0.5% max
Arsenic, ppm	5 max
Cadmium, ppm	2 max
Chromium, ppm	10 max
Lead	50 max
Total Halogens, ppm	1000 max
PCBs, ppm	2 max
Gravity, API	20-30
Flash point, °F	100 min
Biodiesel	
Sulfur, wt. %	0.0054%
Heating value	119,200 Btu/gal (typical)
Cetane no.	55
Nitrogen, ppm	18
Aromatics, vol %	0
Specific gravity	0.88
Ash, wt/ %	none

Alternate Operating Scenarios:

No alternate operating scenarios were identified in the application.

Applicable Requirements:

Hawaii Administrative Rules (HAR)

Title 11, Chapter 59	Ambient Air Quality Standards
Title 11, Chapter 60.1	Air Pollution Control
Subchapter 1	General Requirements
Subchapter 2	General Prohibitions
HAR 11-60.1-31	Applicability
HAR 11-60.1-32	Visible Emissions
HAR 11-60.1-38	Sulfur Dioxides from Fuel Combustion
Subchapter 5	Covered Sources
Subchapter 6	Fees for Covered Sources, Noncovered Sources, and Agricultural Burning
HAR 11-60.1-111	Definitions
HAR 11-60.1-112	General Fee Provisions for Covered Sources
HAR 11-60.1-113	Application Fees for Covered Sources
HAR 11-60.1-114	Annual Fees for Covered Sources

HAR 11-60.1-115	Basis of Annual Fees for Covered Sources
Subchapter 9	Hazardous Air Pollution Sources
HAR 11-60.1-174	Maximum Achievable Control Technology (MACT) Emission Standards

Federal Requirements

40 CFR Part 63 - National Emission Standards for Hazardous Air Pollutants for Source Categories (Maximum Achievable Control Technologies (MACT) Standards)

Subpart JJJJJJ – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources.

Non-applicable Requirements:

Hawaii Administrative Rules (HAR)

Title 11, Chapter 60.1	Air Pollution Control
Subchapter 7	Prevention of Significant Deterioration
Subchapter 8	Standards of Performance for Stationary Sources
Subchapter 9	Hazardous Air Pollution Sources
HAR 11-60.1-180	National Emission Standards for Hazardous Air Pollutants

Federal Requirements

40 CFR Part 52.21 – Prevention of Significant Deterioration of Air Quality

40 CFR Part 60 - Standards of Performance for New Stationary Sources (NSPS)

Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units, is not applicable since a NSPS modification or reconstruction is not triggered due to the proposed change. Under 40 CFR §60.14(e)(4), the use of an alternative fuel or raw material is not considered a modification under the NSPS if the facility was designed to accommodate the alternative fuel or raw material prior to June 19, 1984. The boiler is capable of accommodating this alternative fuel (100% specification used oil) without alteration, as demonstrated in the July 2015 engineering test program.

40 CFR Part 61 - National Emission Standards for Hazardous Air Pollutants (NESHAP)

Prevention of Significant Deterioration (PSD):

PSD is not applicable because this facility is not a *new* major stationary source nor does this application propose any *major modifications* to a major stationary source as defined in 40 CFR 52.21. A *major modification* is defined as a project at an existing major source that will result in a significant and a significant net emissions increase above specified emission thresholds for pollutants subject to regulation.

Pollutant	Current Maximum Annual Emissions from Spec Oil Burning (tpy)	Post-Amendment Current Maximum Annual Emissions from Spec Oil Burning (tpy)	Emission Increase (tpy)	PSD Threshold (tpy)	Exceeds?
NO_x	9.6	19.6	10.0	40	no
SO_2	35.5	35.5	0	40	no
CO	2.5	0.0	-2.5	100	no
VOC	0.1	0.1	0	40	no
PM_{10}	4.0	8.7	4.8	15	no
$PM_{2.5}$	2.8	5.4	2.5	10	no
GHG	11,248	11,050	-199	75,000	no

Best Available Control Technology (BACT):

A Best Available Control Technology (BACT) analysis is required for new or modified sources that have the potential to emit or increase emissions above significant amounts as defined in HAR 11-60.1-1. Since this is not a new source nor are any modifications proposed that have the potential to cause a significant increase in air emissions, a BACT analysis is not required.

Pollutant	Current Maximum Annual Emissions from Spec Oil Burning (tpy)	Post-Amendment Current Maximum Annual Emissions from Spec Oil Burning (tpy)	Emission Increase (tpy)	Significant Threshold (tpy)	Exceeds?
NO_x	9.6	19.6	10.0	40	no
SO_2	35.5	35.5	0	40	no
CO	2.5	0.0	-2.5	100	no
VOC	0.1	0.1	0	40	no
PM_{10}	4.0	8.7	4.8	15	no
$PM_{2.5}$	2.8	5.4	2.5	10	no
GHG	11,248	11,050	-199	75,000	no

Major Source/Synthetic Minor Source Applicability:

This facility is classified as a major source.

AERR/In-house Reporting Applicability:

40 CFR Part 51, Subpart A – Air Emissions Reporting Requirements, is based on the emissions of criteria air pollutants from Type A or Type B point sources (as defined in 40 CFR Part 51, Subpart A), that emit at the AERR triggering levels as shown in the table below.

Pollutant	Type A AERR Triggering Levels [1,2] (tpy)	Type B AERR Triggering Levels [1] (tpy)	Pollutant	In-house Total Facility Triggering Levels [2] (tpy)
NO_x	≥2500	≥100	NO_x	≥25
SO_2	≥2500	≥100	SO_2	≥25
CO	≥2500	≥1000	CO	≥250
$PM_{10}/PM_{2.5}$	≥250/≥250	≥100/100	PM/PM_{10}	≥25/25
VOC	≥250	≥100	VOC	≥25
Pb		≥0.5	Pb	≥5
			HAPS	≥5

[1] Based on potential emissions
[2] Type A sources are a subset of Type B sources and are the larger emitting sources by pollutant.

This facility emits exceeds the Type A triggering levels. Therefore, AERR is applicable.

The Clean Air Branch also requests annual emissions reporting from those facilities that have facility-wide emissions of a single air pollutant exceeding in-house triggering levels. Since the in-house triggering levels are exceeded, annual emissions reporting for the facility will be required for in-house recordkeeping purposes.

Compliance Assurance Monitoring (CAM):

No change from the previous renewal application.

Synthetic Minor Source:

Not applicable, this facility is a major source.

Project Emissions:

Emission Factors (lb/1000 gal)

Fuel	NO_x	SO_2	CO	NMHC	PM_{10}	$PM_{2.5}$	Formaldehyde
Spec Used Oil ≥ 49% of heat input	39.13 [2]	71.0 [4]	1.85E-02 [2]	0.1 [2]	17.5 [2]	10.7 [5]	0.031 [2]
Spec Used Oil ≤ 49% of heat input	19.2 [1,3]	71.0 [4]	5 [1]	0.2 [1]	7.97 [4,6]	5.64 [4,6]	0.048 [1]
100% Distillate Oil	19.2 [1,3]	56.1 [4]	5 [1]	0.2 [1]	2.3 [1]	2.3 [7]	0.048 [1]

Note 1: AP-42 Section 1.3, emission factors for distillate oil firing (Formaldehyde emission factor from Table 1.3-8, average of range for distillate oil firing)
Note 2: June 2015 test results
Note 3: 20% control of NO_x emissions due to low-NO_x burners
Note 4: Sulfur content limit for fuel oil no. 2 = 0.4%
Sulfur content limit for spec used oil = 0.5%
Note 5: PM2.5 fraction of total PM from Table 1.3-5 (56%)
Note 6: AP-42 Section 1.3, emission factors for distillate oil firing

Note 7: In previous applications and modeling analyses for S-1, no distinction was made between PM_{10} and $PM_{2.5}$

Hourly Emission Changes (lb/hr) – Based on 1,000,000 Gallons/Year of Specification Used Oil

	NO_x	SO_2	CO	VOC	PM_{10}	$PM_{2.5}$
Current Maximum Hourly Emissions	22.0	72.8	5.7	0.2	5.9	4.5
Maximum Hourly Emissions After Proposed Change	45.3	82.2	5.7	0.2	20.2	12.4
Net Increase	23.3	9.4	0	0	14.4	7.9

Annual Emission Changes (tpy) – Based on 1,000,000 Gallons/Year of Specification Used Oil

	NO_x	SO_2	CO	VOC	PM_{10}	$PM_{2.5}$	CO2e
Current Maximum Annual Emissions	9.6	35.5	2.5	0.1	4.0	2.8	11,248
Maximum Annual Emissions After Proposed Change	19.6	35.5	0.0	0.1	8.7	5.4	11,050
Net Increase	10.0	0.0	- 2.5	0.0	4.8	2.5	-199
Significant Threshold	40	40	100	40	15	10	75,000

Hourly Emission Changes (lb/hr) – Based on 1,000,000 Gallons/Year of Specification Used Oil

	Formaldehyde (lb/hr)
Current Maximum Hourly Emissions [1]	0.55
Maximum Hourly Emissions After Proposed Change [2]	0.036
Net Increase	- 0.019

Annual Emission Changes (tpy) – Based on 1,000,000 Gallons/Year of Specification Used Oil

	Formaldehyde (tpy)
Current Maximum Annual Emissions [1]	0.024
Maximum Annual Emissions After Proposed Change [2]	0.016
Net Increase	- 0.009

Note 1: Formaldehyde emissions for spec used oil use based on AP-42 emission factor for distillate oil use, based on spec used oil < 50% of heat input.

Note 2: Formaldehyde emissions for spec used oil use from June 2015 engineering tests, based on spec used oil > 50% of heat input.

Ambient Air Quality Impact Analysis:

An ambient air quality impact assessment was performed by the applicant using EPA's guideline AERMOD model (version 15181) to determine the maximum projected impacts from the increase in emissions that would result from the proposed amendment.

Assumptions used in the modeling analysis are the same as those used in previous applications:

- Rural dispersion parameters
- Meteorological data collected at Burns Field during 1993/1994 (located approximately six miles east-northeast of the project site)
- Lihue Airport upper air data

Meteorological data were processed for use in AERMOD (v15181) using AERMET. The EPA guideline Building Profile Input Program (BPIP) was used to derive 36 wind direction-specific building heights and projected widths for use in the model.

Data collected at the Kapolei monitor on Oahu was used for all pollutants and averaging periods for background data. Although there is currently an ambient monitoring station on the island of Kauai, that station is located for the purpose of monitoring the impact of cruise ships in Nawiliwili Harbor. The Kapolei station is believed to better represent existing air quality in the area.

Stack Parameters

Unit Number	Stack Height (m)	Exit Diameter (m)	Exit Velocity (m/s)	Flow Rate (m^3/s)	Exit Temperature (K)
S-1	22.25	2.5	6.9	33.87	451.3

Emission Rates for Modeling

Pollutant	Averaging Period	Emissions Increase (lb/hr)	Emissions Increase (tpy)	Emission Rate for Modeling (g/s)
NO_x	1-hr	23.3	n/a	2.934
NO_x	Annual	n/a	10.0	0.287
SO_x	1, 3, and 24-hr	9.4	n/a	1.184
PM_{10}	24-hr	14.4	n/a	1.813
PM_{10}	Annual	n/a	4.8	0.137
$PM_{2.5}$	24-hr	7.9	n/a	0.989
$PM_{2.5}$	Annual	n/a	2.5	0.073

Modeled Impacts for Changes in Emissions from Steam Boiler

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)	Measured Background Concentration [a] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	AAQS [b] ($\mu g/m^3$)	Percent of AAQS
NO_2	Annual	1.1	7	8.1	75	10.8
	1-hr [c]	87.2	47	134.2	188	71.4
SO_2	24-hr	25.3	20	45.3	365	12.4
	3-hr	33.8	50	83.8	1300	6.4
	1-hr [d]	49.4	54	103.4	196	52.8
PM_{10}	Annual	0.71	16	16.71	50	33.4
	24-hr	38.8	40	78.8	150	52.5
$PM_{2.5}$	Annual	0.4	5.6	6.0	12	50.0
	24-hr [c]	16.9	13.1	30.0	35	85.7

[a] Background concentrations are based on the Kapolei monitoring station. The 3-year maximums from 2012, 2013 and 2014 were used for all pollutants, except for $PM_{2.5}$ (24-hr and annual) is based on a 3-yr average.

[b] Only the more restrictive of the National Ambient Air Quality Standards or State Ambient Air Quality Standards are shown.

[c] 98^{th} percentile project impact plus 98^{th} percentile background concentration.

[d] 99^{th} percentile project impact plus 99^{th} percentile background concentration.

Significant Permit Conditions and Discussion:

1. Attachment II(D), Special Condition No. C.2.

2. Specification (spec) used oil may be burned in steam boiler S-1 at a maximum rate of 1,000,000 gallons per year.

Conclusion:

Recommend issuing the significant modification to Covered Source Permit No. 0097-01-C, issued on December 11, 2012, and amended on April 10, 2013, May 2, 2013, July 17, 2013, January 3, 2014, March 20, 2014, and November 28, 2014. There are small increases in emissions with the proposed change and the boiler would remain in compliance with all State and Federal ambient air quality standards. The permit would incorporate the significant permit condition listed above and be subject to a 30-day public comment period and a 45-day EPA review period.

Reviewer: Darin Lum
Date: 4/2016